

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) An ~~exposure apparatus that exposes a substrate by emitting exposure light onto the substrate through a projection optical system and a liquid, the~~ exposure apparatus comprising:

a substrate stage on which a substrate is held, the substrate stage being movable while holding the substrate;

a projection optical system through which an image of a pattern is projected onto the substrate held by the substrate stage when the substrate is disposed adjacent to a final optical element of the projection optical system, a liquid being provided in a space between the final optical element and the substrate so as to contact the final optical element and the substrate; and

a detection apparatus that detects whether ~~a~~ the liquid is present on an object that is disposed lower than ~~a front end~~ the final optical element of the projection optical system at a time when the exposure light is emitted ~~image of the pattern is projected by the projection optical system~~ onto the substrate, the object being at least one of the substrate stage, the substrate and a member that moves with the substrate stage, by the projection optical system.

2. (Previously Presented) An exposure apparatus according to Claim 1, wherein:

the detection apparatus has an emitting portion that emits detection light and a light receiving portion.

3. (Previously Presented) An exposure apparatus according to Claim 2, wherein:

the detection light is emitted from the emitting portion to a plurality of positions, and at least one of a size and a shape of the liquid on the object is obtained based on a light receiving result of the light receiving portion.

4. (Currently Amended) An exposure apparatus according to Claim 2, wherein:

~~the detection is performed apparatus performs the detection while relatively moving the detection light and the object are relatively moved.~~

5. (Previously Presented) An exposure apparatus according to Claim 4, wherein:

the object is movable with respect to the projection optical system.

6. (Canceled)

7. (Currently Amended) An exposure apparatus according to Claim 2, further comprising:

a bending portion spaced from the liquid and that bends an optical path of the detection light.

8. (Currently Amended) An exposure apparatus according to Claim 2, wherein:

~~the detection light is emitted travels through the space between the final optical element and the substrate substantially parallel to a surface of the object substrate.~~

9. (Previously Presented) An exposure apparatus according to Claim 8, wherein:

whether the liquid is present in an optical path of the detection light is determined based on a light receiving result of the light receiving portion.

10. (Previously Presented) An exposure apparatus according to Claim 8, wherein:

the detection light passes through an area away from the surface of the object by 5.5 mm or less than 5.5 mm.

11. (Previously Presented) An exposure apparatus according to Claim 2, wherein:

a position of the liquid on the object is obtained based on a light receiving result of the light receiving portion.

12. (Currently Amended) An exposure apparatus according to Claim 2, wherein:
the emitting portion emits the detection light to ~~a~~ the space between the
~~projection optical system and the object~~ final optical element and the substrate.
13. (Previously Presented) An exposure apparatus according to Claim 2, wherein:
the emitting portion emits the detection light to a surface of the object.
14. (Previously Presented) An exposure apparatus according to Claim 13,
wherein:
the light receiving portion receives light from the surface of the object, and the
liquid on the surface of the object can be detected based on the light receiving result.
15. (Previously Presented) An exposure apparatus according to Claim 13,
wherein:
the surface of the object includes a recessed portion formed on the object.
16. (Currently Amended) An exposure apparatus according to Claim 15, wherein:
~~the object is the substrate stage, and the recessed portion is provided to a~~ in the
~~substrate stage, that is movable and holds the substrate,~~ and a substrate holder that holds the
substrate is disposed in the recessed portion, and the detection apparatus also detects whether
liquid is present on the substrate holder at a time when the substrate is not held on the
substrate holder.
17. (Previously Presented) An exposure apparatus according to Claim 16,
wherein:
the emission of the detection light to the substrate holder is performed before
loading the substrate on the substrate holder.
18. (Previously Presented) An exposure apparatus according to Claim 2, wherein:
the detection light is infrared light.

19. (Previously Presented) An exposure apparatus according to Claim 2, wherein:
the detection light includes a sheet light flux.
20. (Currently Amended) An exposure apparatus according to Claim 1, further
comprising:

a liquid supply system having a supply port, that supplies the liquid; ~~and~~
a liquid recovery system having a recovery port, that recovers the liquid; ~~and~~
~~wherein a controller that controls an operation of at least one of the liquid~~
supply system and the liquid recovery system ~~is controlled~~ based on a detection result of the
detection apparatus.
21. (Currently Amended) An exposure apparatus according to Claim 20, wherein:
~~the controller stops the supply of the liquid by the liquid supply system is~~
~~stopped if it is determined that the detection result of the detection apparatus is abnormal.~~
22. (Previously Presented) An exposure apparatus according to Claim 1, wherein:
an exposure operation is controlled based on a detection result of the detection
apparatus.
23. (Previously Presented) An exposure apparatus according to Claim 1, wherein:
a warning is issued if it is determined that a detection result of the detection
apparatus is abnormal.
24. (Currently Amended) An exposure apparatus that exposes a substrate by
~~emitting exposure light onto the substrate through a projection optical system and a liquid, the~~
exposure apparatus comprising:

~~a substrate stage on which a substrate is held, the substrate stage being~~
~~movable while holding the substrate;~~

~~a projection optical system through which an image of a pattern is projected~~
~~onto the substrate held by the substrate stage when the substrate is disposed adjacent to a final~~

optical element of the projection optical system, a liquid being provided in a space between the final optical element and the substrate so as to contact the final optical element and the substrate;

a liquid supply system having a supply port, which supplies the liquid to the space such that the liquid covers only a portion of forms an immersion area on a surface of the substrate or on a surface of the substrate stage adjacent to the substrate or on both the surface of the substrate and the surface of the substrate stage, the immersion area having a size that is smaller than an area of a the surface of the substrate onto which the image of the pattern is projected; and at a time when the exposure light is emitted onto the substrate; and

a detection apparatus having a light receiving portion, provided in a space lower than the supply port of the liquid supply system, wherein the detection apparatus detects a position of an edge portion of an the immersion area in a direction perpendicular to an optical axis of the projection optical system, that is formed between the projection optical system and an object disposed on an image plane side of the projection optical system, based on a light receiving result of the light receiving portion.

25. (Previously Presented) An exposure apparatus according to Claim 24, wherein:

the detection apparatus includes an emitting portion that emits detection light, and at least one of a size and a shape of the immersion area is obtained based on the light receiving result of the detection light.

26. (Currently Amended) An exposure apparatus according to Claim 24, wherein:
a detection by the detection apparatus is performed in parallel with the exposure of projection of the image of the pattern onto the substrate.

27. (Previously Presented) An exposure apparatus according to Claim 24, wherein:

the detection apparatus includes an emitting portion that emits detection light, and the detection light is emitted to the vicinity of the edge portion of the immersion area.

28. (Previously Presented) An exposure apparatus according to Claim 24,

wherein:

the detection apparatus includes an emitting portion that emits detection light, and the detection light is emitted to each of a plurality of positions in the vicinity of the edge portion of the immersion area.

29. (Previously Presented) An exposure apparatus according to Claim 28,

wherein:

optical paths of a plurality of beams of the detection light emitted to the vicinity of the edge portion are set in accordance with a target shape of the immersion area.

30. (Currently Amended) An exposure apparatus according to Claim 28, wherein:

at least two of ~~the~~ a plurality of beams of the detection light are emitted to the vicinity of the edge portions portion on both sides of the immersion area, respectively.

31. (Currently Amended) An exposure apparatus according to Claim 24, further comprising:

a liquid recovery system having a recovery port, that recovers the liquid; and
~~wherein~~ a controller that controls an operation of at least one of the liquid supply system and the liquid recovery system ~~is controlled~~ based on a detection result of the detection apparatus.

32. (Currently Amended) An exposure apparatus according to Claim 31, wherein:

the controller stops the supply of the liquid by the liquid supply system ~~is stopped~~ if it is determined that the detection result of the detection apparatus is abnormal.

33. (Currently Amended) An exposure apparatus according to Claim 31, wherein:
the controller stops the supply of the liquid by the liquid supply system is stopped if the immersion area of the liquid formed between the projection optical system and the substrate has become equal to, or larger than a predetermined size.

34. (Previously Presented) An exposure apparatus according to Claim 24, wherein:

the detection apparatus includes an emitting portion that emits detection light, and the detection light is infrared light.

35. (Previously Presented) An exposure apparatus according to Claim 24, wherein:

the detection apparatus includes an emitting portion that emits detection light, and the detection light includes a sheet light flux.

36. (Currently Amended) An exposure apparatus that exposes a substrate by emitting exposure light onto the substrate through a projection optical system and a liquid, the exposure apparatus comprising:

a substrate stage on which a substrate is held, the substrate stage being movable while holding the substrate;

a projection optical system through which an image of a pattern is projected onto the substrate held by the substrate stage when the substrate is disposed adjacent to a final optical element of the projection optical system, a liquid being provided in a space between the final optical element and the substrate so as to contact the final optical element and the substrate; and

a shape detection apparatus that obtains a shape of the liquid on an object which is movable on an image plane side of the projection optical system, the object being at

least one of the substrate stage, the substrate and a member that moves with the substrate stage.

37. (Previously Presented) An exposure apparatus according to Claim 36, wherein:

the detection apparatus has an emitting portion that emits a plurality of detection light arrayed in a vertical direction with respect to a surface of the object, and a light receiving portion, wherein the detection apparatus obtains the shape of the liquid based on a light receiving result of the light receiving portion.

38. (Previously Presented) An exposure apparatus according to Claim 36, wherein:

an affinity of the liquid for the object is obtained based on the obtained shape of the liquid.

39. (Previously Presented) An exposure apparatus according to Claim 36, wherein:

a contact angle of the liquid with respect to the object is obtained based on the obtained shape of the liquid.

40. (Previously Presented) An exposure apparatus according to Claim 39, wherein:

the detection apparatus detects a height of the liquid on the object, and obtains the contact angle of the liquid with respect to the object based on a result of the detection.

41. (Canceled)

42. (Currently Amended) An exposure apparatus that exposes a substrate by emitting exposure light onto the substrate through a projection optical system and a liquid, the exposure apparatus comprising:

a substrate stage on which a substrate is held, the substrate stage being movable while holding the substrate;
a projection optical system through which an image of a pattern is projected onto the substrate held by the substrate stage when the substrate is disposed adjacent to a final optical element of the projection optical system, a liquid being provided in a space between the final optical element and the substrate so as to contact the final optical element and the substrate; and

a detection apparatus that detects a contact angle of the liquid, on an upper surface of ~~a~~ the substrate stage that holds the substrate, with respect to the upper surface of the substrate stage.

43. (Previously Presented) An exposure apparatus according to Claim 42, wherein:

the contact angle of the liquid with respect to the upper surface of the substrate stage is obtained periodically.

44. (Previously Presented) An exposure apparatus according to Claim 42, wherein:

the upper surface of the substrate stage includes a surface of a member which is replaceably disposed on the substrate stage, and the member is replaced based on the detected contact angle.

45. (Previously Presented) An exposure apparatus according to Claim 42, wherein:

the upper surface of the substrate stage includes a surface of the substrate held by the substrate stage.

46. (Currently Amended) An exposure apparatus according to Claim 42, further comprising:

a liquid supply system having a supply port, that supplies the liquid; and
a liquid recovery system having a recovery port, that recovers the liquid; and
wherein a controller that controls an operation of at least one of the liquid
supply system and the liquid recovery system ~~is controlled~~ based on the detected contact
angle.

47. (Previously Presented) An exposure apparatus according to Claim 42,
wherein:

the detection apparatus detects the contact angle by emitting infrared light.

48. (Currently Amended) A device manufacturing method comprising:
exposing ~~a~~ the substrate through the projection optical system of the exposure
apparatus according to Claim 1; and

processing the exposed substrate.

49. (Currently Amended) A device manufacturing method comprising:
exposing ~~a~~ the substrate through the projection optical system of the exposure
apparatus according to Claim 24; and

processing the exposed substrate.

50. (Currently Amended) A device manufacturing method comprising:
exposing ~~a~~ the substrate through the projection optical system of the exposure
apparatus according to Claim 36; and

processing the exposed substrate.

51. (Currently Amended) A device manufacturing method comprising:
exposing ~~a~~ the substrate through the projection optical system of the exposure
apparatus according to Claim 42; and

processing the exposed substrate.